

Subject Curriculum Information Pack



Pedmore
High School

Aspire, Persevere, Succeed

Curriculum Intent



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Pedmore High School Mathematics Curriculum Rationale

The mathematics curriculum aims to develop:

- **Fluency** of basic mathematical skills including through varied and frequent practise with increasingly complex problems over time so that pupils develop understanding and the ability to recall and apply knowledge rapidly and accurately.
- The ability to **reason mathematically** by conjecturing relationship and generalisations, developing arguments and proving statements using correct mathematical language .
- The ability to **solve problems** by applying their mathematics to a variety of routine and nonroutine problems by breaking down problems into a series of simpler steps and persevering in seeking solutions in order to promote independence and resilience.
- To build on the mathematics that has been taught previously to enable students to master key skills and to make rapid progress.

Intent

At Pedmore High School our Maths curriculum is designed to develop a passion for mathematics which students will take with them throughout their school life and beyond, whilst building curiosity about the mathematics around them and ask about `why` and `how` concepts arise. A curriculum that enables students to become successful learners who are ready to learn, make progress and achieve in mathematics and to ensure students have the confidence and aptitude to apply their mathematical skills. We believe that a learning environment that supports all learners to be able to access the curriculum and achieve, providing challenge opportunities through “pitching it high”, will ensure they have access to study Maths and related courses beyond GCSE and A Level, at University and through their career ambitions.

Implementation:

Pupils follow the Kangaroo Invictus Scheme of Work through KS3 and 4. The SOW in both key stages has an emphasis on building pupils' problem solving and reasoning skills and develops recall and application of knowledge through a sequence of lessons that build, by constantly revisiting and extending topics throughout the years. This compliments the National Curriculum which makes reference to each key stage which consolidates the learning that has already taken place. It will also have reference to "end points" which are regularly shared to enable students understand the main learning and skills that are the foundations to progress.

Formal Assessment points take place towards the end of each full term. Formative "low stakes" assessments are used regularly to check progress in the form of "exit tickets", "do it now tasks", "bread and butter" tasks and "blast from the past" activities all designed to engage students with their ability to recall key skills and understanding. At Key stage 4 each assessment is GCSE levelled. Homework is set via the use of Hegarty and written homework linked to **knowledge Organisers** which are evident in all books and linked to key topics on the SOW.

Students track progress through an in-depth analysis of assessment outcomes and respond immediately with "next steps" which are set by teachers to address misconceptions.

Our 5-year plan outlines the units covered throughout the years and the constant recap and extension helps to build pupils knowledge. It also aligns with the year 5 to 8 curriculum mapping through our collaborative planning with primary colleagues.

Impact:

By the end of KS4 all pupils should be confident, resilient and competent mathematicians equipped with the skills needed for their future mathematical journey.

As individuals and as a department, we are passionate about mathematics and in doing so, we wish to help pupils see the importance of mathematics during lessons and within our enrichment programme and its application in life as well as the enjoyment mathematics can bring.

We encourage all pupils to be able to see the mathematical links to a range of subjects studied at school by giving those opportunities to develop a high level of numeracy required for success in the wider curriculum and in adult life.

Key Stage 3 - Working mathematically

Through the mathematics content, pupils are taught to:

Develop fluency

- consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots
- select and use appropriate calculation strategies to solve increasingly complex problems
- use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- substitute values in expressions, rearrange and simplify expressions, and solve equations
- move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]
- develop algebraic and graphical fluency, including understanding linear and simple quadratic functions
- use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.

Reason mathematically

- extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations
- extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically

- identify variables and express relations between variables algebraically and graphically
- make and test conjectures about patterns and relationships; look for proofs or counter-examples
- begin to reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally.

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
- begin to model situations mathematically and express the results using a range of formal mathematical representations
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

Key Stage 4 - Working mathematically

Through the mathematics content pupils should be taught to:

Develop fluency

- consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots and fractional indices
- select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π and surds, use of standard form and application and interpretation of limits of accuracy
- consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions, and expressions involving surds and algebraic fractions

- extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities
- move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, exponential and trigonometric functions
- use mathematical language and properties precisely.

Reason mathematically

- extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically
- extend their ability to identify variables and express relations between variables algebraically and graphically
- make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments and proofs
- reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally
- assess the validity of an argument and the accuracy of a given way of presenting information.

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts
- make and use connections between different parts of mathematics to solve problems
- model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions

- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.

Year 7 Curriculum Assessment Map



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Curriculum Assessment Map: Year 7 Mathematics

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	Numbers and the Number System Checking, Approximating and Estimating Calculating	Visualising and Constructing Investigating Properties of Shapes Exploring Fractions, Decimals and Percentages	Algebraic Proficiency: Tinkering Proportional Reasoning Sequences	Measuring Space Investigating Angles Calculating Fractions, Decimals and Percentages	Solving Equations And Inequalities Calculating Space Mathematical Movement	Presentation of Data Measuring Data Revision of key concepts as identified from assessments
Key Learning & Skills	<ul style="list-style-type: none"> • Factors, multiples and primes • Powers and roots • Sequences • Rounding • Estimation • BIDMAS • Perform mental and written calculations using the four operations, including with mixed operations, large, negative and decimals numbers. 	<ul style="list-style-type: none"> • Drawing 2D shapes • 3D shapes and their nets. • Labelling sides and angles of triangles. • Constructing triangles • Measuring lines and angles. • Calculating angles in polygons. • Circles and their properties. • Equivalence between fractions, decimals and percentages. • Compare and order fractions. • Use common factors and multiples with fractions. • Percentages 	<ul style="list-style-type: none"> • Use vocabulary of expressions, equations, formulae and terms. • Use and interpret algebraic notation. • Use simple formulae. • Convert between miles and kilometres. • Use ratio notation, including reduction to simplest form. • Dividing a quantity into a given ratio. • Similar shapes • Generate linear number sequences. • Generate the nth term of a sequence. 	<ul style="list-style-type: none"> • Use standard units of mass, time, length, money and other measures. • Use, read, write and convert between standard units. • Measure line segments and angles in geometric figures. • Describe properties and find missing angles of angles at a point, in a line or are vertically opposite. • Apply four operations to fractions, including improper and mixed numbers. • Solve problems including percentage change. • Find percentages of a quantity and be able to make comparisons. 	<ul style="list-style-type: none"> • Solving equations with one unknown. • Solve multi step equations where the solution is either an integer or fraction. • Find pairs of numbers that solve equations with 2 unknowns. • Calculate the perimeter and area of 2D shapes. • Calculate, estimate and compare the volume of cubes and cuboids. • Know formulae of area and volume of a shape. • Solve multistep problems involving the calculation and conversion of units. • Understand a 4-quadrant coordinate grid. • Translate and reflect simple shapes. • Use vectors to describe translation. • Solve geometric problems. • Identify, describe and construct congruent shapes. 	<ul style="list-style-type: none"> • Interpret and construct tables, charts and diagrams including: frequency tables, bar and pie charts and pictograms for categorical data. • Use vertical line charts for ungrouped discrete numerical data. • Compare distributions through central tendency and spread. • Calculate and interpret mean as an average.

Curriculum Assessment Map: Year 7 Mathematics

<p>End points</p>	<p>Foundation Core</p> <ul style="list-style-type: none"> • Use positive integer powers and associated real roots • Apply the four operations with decimal numbers • Write a quantity as a fraction or percentage of another • Use multiplicative reasoning to interpret percentage change • Add, subtract, multiply and divide with fractions and mixed numbers • Check calculations using approximation, estimation or inverse operations • Simplify and manipulate expressions by collecting like terms • Simplify and manipulate expressions by multiplying a single term over a bracket • Substitute numbers into formulae • Solve linear equations in one unknown • Understand and use lines parallel to the axes, $y = x$ and $y = -x$ • Calculate surface area of cubes and cuboids • Understand and use notation for labelling angles, lengths, equal lengths and parallel lines 			<p>Higher Core</p> <ul style="list-style-type: none"> • Apply the four operations with negative numbers • Convert numbers into standard form and vice versa • Apply the multiplication, division and power laws of indices • Convert between terminating decimals and fractions • Find a relevant multiplier when solving problems involving proportion • Solve problems involving percentage change, including original value problems • Factorise an expression by taking out common factors • Change the subject of a formula when two steps are required • Find and use the nth term for a linear sequence • Solve linear equations with unknowns on both sides • Plot and interpret graphs of linear functions • Apply the formulae for circumference and area of a circle • Calculate theoretical probabilities for single events 			
<p>Informal (formative) Assessment</p>	<p>Hegarty homework tasks Exit tickets GRIT</p>						
<p>Formal (summative) Assessment</p>	<p>Year 7 Test 1</p>	<p>Year 7 Test 2</p>	<p>Year 7 Test 3</p>	<p>Year 7 Test 4</p>	<p>Year 7 Test 5</p>	<p>Year 7 Test 6</p>	

Year 8 Curriculum Assessment Map



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Curriculum Assessment Map: Year 8 Mathematics

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	Numbers and the Number System Calculating Checking, Approximating and Estimating	Counting and Comparing Visualising and Constructing Investigating Properties of Shapes Algebra: Simplifying	Exploring Fractions, Decimals and Percentages Proportional Reasoning Sequences Measuring Space	Investigating Angles Calculating Fractions, Decimals and Percentages Solving Equations	Calculating Space Mathematical Movement Algebra Graphs	Probability Presentation of Data Measuring Data Revision of key concepts as identified from assessments
Key Learning & Skills	<ul style="list-style-type: none"> • Prime Numbers • Lowest Common Multiple • Prime Factorisation • Product Notation • Factorisation Theorem • Rounding including decimal places and significant figures • Written methods to calculate integers, decimals, fractions and mixed numbers (positive/negative) • BIDMAS • Place value • Inverse operations • Estimating 	<ul style="list-style-type: none"> • Interpret standard form. • Order positive and negative integers, decimals and fractions. • Use the symbols =, ≠, >, <, ≥, ≤. • Use key terminology to explain shapes. • Draw diagrams from written descriptions • Identify properties of shapes • Apply properties and definitions to shapes. • Use vocabulary of expressions, equations, formulae and terms. • Interpret algebraic notation • Simplify expressions • Interpret functions with inputs and outputs • Substitute into formulae and expressions • BIDMAS 	<ul style="list-style-type: none"> • Express one quantity as a fraction of another. • Define percentage as 'number of parts per hundred'. • Express one quantity as a percentage of another. • Express division of a quantity into a ratio. • Apply ratio to real life context. • Use proportion as equality of ratios. • Express multiplicative relationship between 2 quantities (ratio/fraction). • Compound units • Simplify ratio • Divide a quantity by a given ratio. • Generate terms of a sequence from a term-to-term rule. 	<ul style="list-style-type: none"> • Understand alternate and corresponding angles on parallel lines. • Apply the properties of angles round a point, on a straight line and vertically opposite. • Deduce the angle sum in any polygon. • Work with percentages greater than 100%. • Solve problems involving percentage change including simple interest (financial mathematics) • Calculate exactly with fractions. • Compare two quantities using percentages. • Solve linear equations with one unknown and with unknowns on both sides. • Find solutions using a graph. 	<ul style="list-style-type: none"> • Compare lengths, areas and volumes. • Calculate perimeter of 2D shapes, including circles. • Identify and apply circle definitions and properties. • Know the formulae for area and circumference of a circle. • Calculate areas of circles and composite shapes. • Calculate the volume of prisms (including cylinders). 	<ul style="list-style-type: none"> • Apply systematic listing strategies. • Describe and analyse outcomes of experiments using frequency trees. • Enumerate sets systematically using tables, grids and Venn diagrams. • Construct and calculate possibility spaces for combined experiments. • Use the probability scale. • Apply the property of exhaustive events sum to one. • Interpret, analyse and compare distributions. • Interpret scatter graphs and recognise correlation. • Interpret and construct tables, charts and diagrams. • Compare data using median, mean, mode and range. • Apply statistics to describe population

Curriculum Assessment Map: Year 8 Mathematics

<p>End points</p>	<p>Foundation Core</p> <ul style="list-style-type: none"> • Apply the four operations with negative numbers • Convert numbers into standard form and vice versa • Apply the multiplication, division and power laws of indices • Convert between terminating decimals and fractions • Find a relevant multiplier when solving problems involving proportion • Solve problems involving percentage change, including original value problems • Factorise an expression by taking out common factors • Change the subject of a formula when two steps are required • Find and use the nth term for a linear sequence • Solve linear equations with unknowns on both sides • Plot and interpret graphs of linear functions • Apply the formulae for circumference and area of a circle • Calculate theoretical probabilities for single events 		<p>Higher Core</p> <ul style="list-style-type: none"> • Calculate with roots and integer indices • Manipulate algebraic expressions by expanding the product of two binomials • Manipulate algebraic expressions by factorising a quadratic expression of the form $x^2 + bx + c$ • Understand and use the gradient of a straight line to solve problems • Solve two linear simultaneous equations algebraically and graphically • Plot and interpret graphs of quadratic functions • Change freely between compound units • Use ruler and compass methods to construct the perpendicular bisector of a line segment and to bisect an angle • Solve problems involving similar shapes • Calculate exactly with multiples of π • Apply Pythagoras' theorem in two dimensions • Use geometrical reasoning to construct simple proofs • Use tree diagrams to list outcomes 			
<p>Informal (formative) Assessment</p>	<ul style="list-style-type: none"> • Hegarty homework tasks <ul style="list-style-type: none"> • Exit tickets • GRIT 					
<p>Formal (summative) Assessment</p>	<ul style="list-style-type: none"> • Year 8 Test 1 	<ul style="list-style-type: none"> • Year 8 Test 2 	<ul style="list-style-type: none"> • Year 8 Test 3 	<ul style="list-style-type: none"> • Year 8 Test 4 	<ul style="list-style-type: none"> • Year 8 Test 5 	<ul style="list-style-type: none"> • Year 8 Test 6

Year 9 Curriculum Assessment Map



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Curriculum Assessment Map: Year 9 Mathematics

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	<p>Numbers and the Number System</p> <p>Calculating</p> <p>Visualising and Constructing</p>	<p>Algebra: Simplifying</p> <p>Exploring Fractions, Decimals and Percentages</p> <p>Proportional Reasoning</p>	<p>Sequences</p> <p>Solving Equations 1</p> <p>Investigating Angles</p>	<p>Calculating Fractions, Decimals and Percentages</p> <p>Solving Equations 2</p>	<p>Calculating Space</p> <p>Algebra: Graphs</p> <p>Probability</p>	<p>Presentation of Data</p> <p>Measuring Data</p> <p>Revision of key concepts as identified from assessments</p>
Key Learning & Skills	<ul style="list-style-type: none"> • Prime Numbers • Lowest Common Multiple • Prime Factorisation • Product Notation • Factorisation Theorem • Rounding including decimal places and significant figures • Interpret standard form. • Written methods to calculate integers, decimals, fractions and mixed numbers (positive/negative) • BIDMAS • Interpreting maps and scale drawings and use of bearings. • Identify, describe and construct similar shapes. • Use scale factors, scale drawings and maps. 	<ul style="list-style-type: none"> • Interpret algebraic notation. • Use the concepts and vocabulary of factors. • Simplify and manipulate expressions. • Substitute values into scientific formulae. • Rearrange formulae to change the subject. • Work interchangeably with terminating decimals and their corresponding fractions. • Solve problems involving direct and inverse proportion (graphically and algebraically). • Apply concepts of congruence and similarity. • Compound unit • Express division of a quantity into a ratio. • Link proportion and ratio. 	<ul style="list-style-type: none"> • Generate terms of a sequence from either a term-to-term or a position-to-term rule. • Calculate the nth term. • Solve simultaneous equations algebraically and graphically. • Derive simultaneous equations and solve. • Solve linear equations with unknowns on both sides. • Find solutions to linear equations using a graph. • Use congruence facts • Apply angle facts to obtain simple proof. • Understand alternate and corresponding angles on parallel lines. • Deduce the angle sum in any polygon. 	<ul style="list-style-type: none"> • Interpret fractions and percentages as operators. • Work with percentages greater than 100% • Solve problems involving percentage change and simple interest (financial mathematics). • Calculate exactly with fractions. • Use concepts and vocabulary of inequalities. • Solve linear inequalities with one unknown. • Represent the solution set on a number line. 	<ul style="list-style-type: none"> • Identify and apply circle definitions. • Calculate arc lengths, angles and areas of sectors of circles. • Calculate surface area and volume of prisms (including cylinders). • Exact calculations with π. • Pythagoras's Theorem • Compare lengths, area and volume. • Perimeters of 2D shapes, including circles. • Calculate area and circumference of circles. • Interpret gradients and intercepts • Use $y = mx + c$ • Find equation of line between 2 points. • Recognise and interpret linear, quadratic and cubic graphs. • Plot linear graphs. • Calculate independent and dependant combine events using tree diagrams. • Describe and analyse outcomes of probability experiments. • Construct possibility spaces top calculate probabilities. 	<ul style="list-style-type: none"> • Interpret and construct tables, charts and diagrams. • Draw lines of best fit to make predictions. • Understand correlation and the effects. • Compare distributions of data sets – discrete, continuous and grouped data. • Interpret scatter graph of bivariate data. • Compare distributions through central tendency and spread. • Describe populations using statistics – understanding there are limitations of sampling.

Curriculum Assessment Map: Year 9 Mathematics

<p>End points</p>	<p>Foundation Core</p> <ul style="list-style-type: none"> • Know the meaning of powers and roots • Know the multiplication and division laws of indices • Understand and interpret numbers using standard form. • Round to a given number of decimal places or significant figures • Know the meaning of the inequality symbols • Solve linear equations by balancing when the solution is a whole number or a fraction • Work with coordinates in all four quadrants • Carry out a reflection, rotation and translation. • Manipulate expressions by collecting like terms • Calculate with negative numbers • Know the difference between an expression, an equation and a formula. • Solve basic ratio, best buys, recipe problems. • Find a relevant multiplier in a situation involving proportion • Plot the graph of a linear function • Understand the meaning of a compound unit • Convert between units of length, capacity, mass and time. • Generate a linear sequence from its nth term • Find the nth term for a linear sequence • Substitute numbers into formulae • Solve linear equations including those with unknowns on both sides. • Know and use the number π • Know and use the formula for area and circumference of a circle • Calculate the area of rectangles, parallelograms, triangles, trapezia and compound shapes. • Apply basic angle facts including angles at a point, on a line and in a triangle • Apply angle facts involving parallel lines and vertically opposite angles • Know and apply Pythagoras' theorem. • Plot straight-line graphs and non-standard graphs. • Interpret gradients and intercepts of linear functions graphically and algebraically • Recognise, sketch and interpret graphs of linear and simple quadratic functions • Calculate with proper fractions, improper fractions and mixed numbers • Use calculators to find a percentage of an amount and percentage increase/decrease. • Know that percentage change = $\frac{\text{actual change}}{\text{original amount}}$ • Convert between fractions, decimals and percentages • Use experimental and theoretical probability to calculate expected outcomes • Construct and interpret Frequency tables, pictograms, bar charts, pie charts, tables, vertical line charts and scatter diagrams. 			<p>Higher Core</p> <ul style="list-style-type: none"> • Understand and work with similar shapes • Solve linear equations, including those with the unknown in the denominator of a fraction • Know the meaning of powers and roots. • Know the multiplication and division laws of indices • Understand and interpret numbers using standard form. • Round to a given number of decimal places or significant figures • Know the meaning of the inequality symbols • Solve linear equations by balancing when the solution is a whole number or a fraction • Calculate with positive indices using written methods and negative indices in the context of standard form • Understand and apply the concept of solving simultaneous equations by elimination. • Carry out reflection, rotations, translations and enlargements of 2D shapes • Calculate with negative numbers • Multiply two linear expressions of the form $(x \pm a)(x \pm b)$ • Factorise a quadratic expression when $a \geq 1$ • Add, subtract, multiply and divide fractions. • Change the subject of a formula when two steps are required. • Find the nth term for a linear sequence. • Identify and work with quadratic sequences. • Use a formal method to solve an inequality in one/two variables and show on a number line. • Calculate the area and circumference of a circle • Calculate the area of rectangles, parallelograms, triangles, trapezia, circles, sectors and compound shapes. • Calculate the surface area of a right prism and a cylinder • Know the vocabulary of circles • Apply basic angle facts including angles at a point, on a line and in a triangle • Apply angle facts involving parallel lines and vertically opposite angles • Plot graphs of linear, quadratic, cubic, reciprocal functions and non-standard functions. • Use a multiplier to calculate the result of percentage changes • Know when to add or multiply two or more probabilities • Convert between fractions, decimals and percentages • Use a tree diagram to calculate probabilities of dependent and independent combined events • Interpret and construct frequency tables • Analyse data using measures of central tendency • Understand and apply $y = mx + c$ to different problems. • Know and apply Pythagoras' Theorem • Understand column vector notation 		
<p>Informal (formative) Assessment</p>	<ul style="list-style-type: none"> • Hegarty homework tasks <ul style="list-style-type: none"> • Exit tickets • GRIT 					
<p>Formal (summative) Assessment</p>	<p>Year 8 Test 1</p>	<p>Year 8 Test 2</p>	<p>Year 8 Test 3</p>	<p>Year 8 Test 4</p>	<p>Year 8 Test 5</p>	<p>Year 8 Test 6</p>

Curriculum Assessment Map: Year 9 Mathematics





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